

## EXHIBIT A



**EXHIBIT B**

 <b>Medtronic</b>	<i>Neurological</i>	Document Number <b>288117-70205</b>	Rev/Version 1.0	Sht 1 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

**Revision History:**

Revision	Comments
1.0	Initial release for routing

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### 1 INTRODUCTION

This document is the electrical Design Verification Test (DVT) Report for the 37741 Patient Programmer Platform.

#### 1.1 Purpose

The purpose of this report is to document the results of test plan

#### 1.2 Scope

This report applies only to design verification testing of the 37741 Patient Programmer Platform.

#### 1.3 Document Overview

This document is organized as follows:

- Section 2 contains references and definitions.
- Section 3 contains a table with the list of tests, software revisions, sample sizes, and test results.
- Section 4 contains the results of the electrical design verification tests.

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## 2 REFERENCES AND DEFINITIONS

This section identifies internal and external reference documents that augment the information provided in this document. It also defines terms, acronyms, and abbreviations used within the document.

### 2.1 Internal Medtronic References

Number	Name
120275	
215387	
288117-70040	
288117-70044	
288117-70029	
503011001	
288117-70200	

Note: Document revisions referenced in DVT Plan.

### 2.2 External References

Reference the PEM Electrical Specification for external specification standards.

### 2.3 Definitions, Acronyms, and Abbreviations

**ARB:** Arbitrary Waveform Generator

**ARB equipment:** One or more arbitrary waveform generators, used alone or in conjunction to generate sophisticated waveforms.

**DUT:** Device Under Test

**DVT:** Design Verification Test

**DVT Console:** The test console needed to perform the tests specified herein.

**ES:** Electrical Specification #120275

**GPIB:** General Purpose Interface Bus

**PEM:** Patient Electronic Module

**PP:** Patient Programmer

**POR:** Power On Reset

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### 3 Test Results Summary

Table 1 summarizes the results of all electrical design verification testing. Section 4 details each test setup, criteria, and results.

- Test data is stored as 288117-70200.
- Table 1 indicates test name, sample size, DUT software revision, Test Script Software revision, test path, and results.
- Test paths are shown in section 3.1.

Table 1

Test Name	Sample Size	DUT Software Revision	Script Software Test Revision	Test Path	Results
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	22				PASS
	1				PASS

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### 3.1 Test Paths

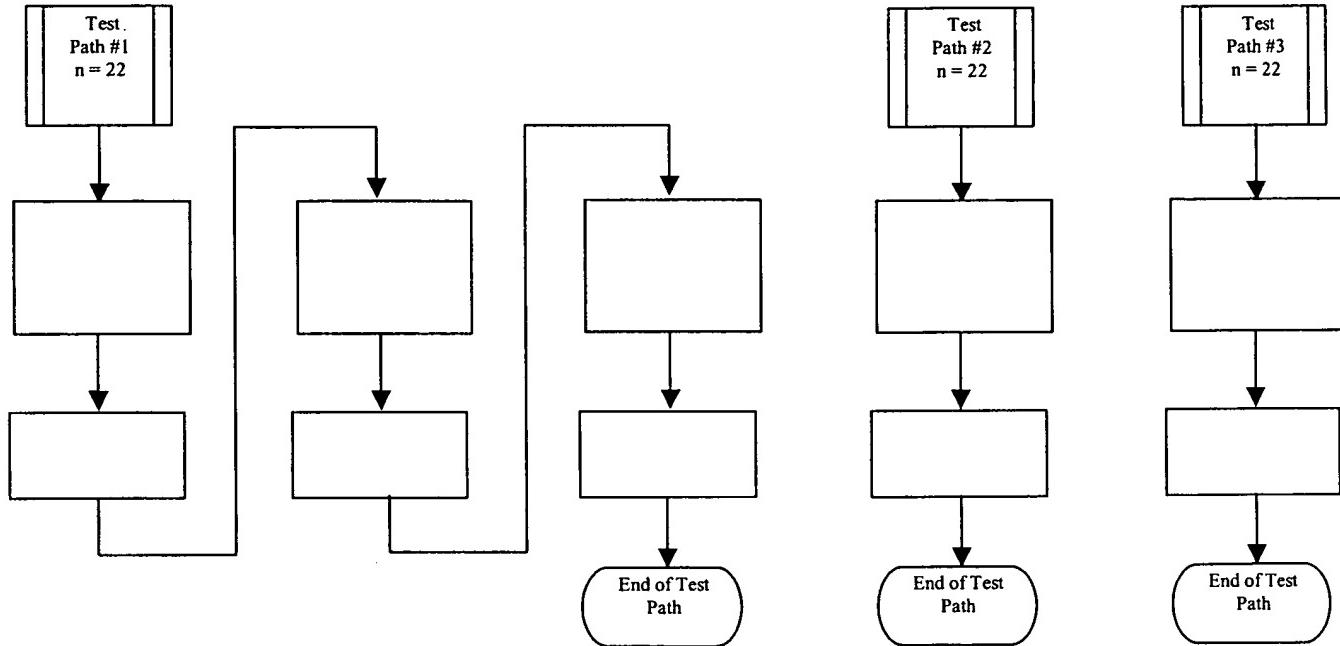


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## 4 ELECTRICAL TESTS

This section specifies electrical tests performed on the 37741 Patient Programmer Platform.

### 4.1 Power Source Tests

#### 4.1.1 Current Drain Test

##### 4.1.1.1 Objective

To verify the current drain meets the requirements specified in the *Power Source* section of the PEM Electrical Specification.

##### 4.1.1.2 Method and Equipment

##### 4.1.1.3 Test Cases

There are .. test cases for transmit using all combinations of test values below:

Parameter	Test Values	Units

The

There are .. test cases using all combinations of test values below:

Parameter	Test Values	Units

There are .. test cases using two combinations of test values below:

Parameter	Test Values	Units

There are .. total test cases.

##### 4.1.1.4 Acceptance Criteria

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Operating Condition (Ref.)	Antenna	Duty Cycle (%)	Current Drain (mA) MAX		
			V	V	V
Row A	INT				
Row B	INT				
Row C	INT				
Row D	INT				
Row E	INT				
Row F	INT				
Row G	INT				
Row H	EXT				
Row I	INT	.....			
Row J	INT				

Note 1:

#### 4.1.1.5 Test Setup

- 1.
- 2.
- 3.
- 4.

#### 4.1.1.6 Test Procedure

- 1.
- 2.

- 3.
- 4.

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**4.1.1.7 RESULTS PASS**

All devices met the acceptance criteria.

Operating Condition	Current Drain (mA) MAX															
	Row	Spec	Min	Max	Mean	Std Dev	Spec	Min	Max	Mean	Std Dev	Spec	Min	Max	Mean	Std Dev
A																
B																
C																
D																
E																
F																
G																
H																
I																
J																

**4.1.2 Supply Voltage Range Test****4.1.2.1 Objective**

To verify the supply voltage range meets the requirements specified in the Power Source section of the PEM Electrical Specification.

**4.1.2.2 Method and Equipment****4.1.2.3 Test Cases**

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Parameter	Test Values	Units

The

There is test case without transmit:

Parameter	Test Values	Units

#### **4.1.2.4 Acceptance Criteria**

Operating Condition	Antenna	H-Bridge Drive Duty Cycle (%)	Min operating voltage (V)

#### **4.1.2.5 Test Setup**

- 1.
- 2.
- 3.
- 4.

#### **4.1.2.6 Test Procedure**

- 1.
- 2.
- 3.

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**4.1.2.7 RESULTS PASS**

All devices met the acceptance criteria.

Operating Condition	Antenna	Supply Voltage Range (Volts)			
		Min	Max	Avg	Std Dev

**4.2 Input/Output Connections Tests****4.2.1 Keypad Interface Test****4.2.1.1 Objective**

To verify the keypad interface meets the requirements specified in the *Input/Output Connections* section of the PEM Electrical Specification.

**4.2.1.2 Method and Equipment****4.2.1.3 Test Cases**

Parameter	Test Values	Units

**4.2.1.4 Acceptance Criteria****4.2.1.5 Test Setup**

- 1.
- 2.
- 3.

**4.2.1.6 Test Procedure**

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3.

#### 4.2.1.7 RESULTS PASS

All devices met the acceptance criteria.

Tests	Keypad Interface (pass/fail)		
	Pass	Pass	Pass
	Pass	Pass	Pass
	Pass	Pass	Pass

#### 4.2.2 Display Interface Test

##### 4.2.2.1 Objective

To verify the display interface meets the requirements specified in the *Input/Output Connections* section of the PEM Electrical Specification.

##### 4.2.2.2 Method and Equipment

##### 4.2.2.3 Test Cases

There are test cases using combinations of the test values below:

Parameter	Test Values	Units

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**4.2.2.4 Acceptance Criteria**

Test Parameters				Requirements				

**4.2.2.5 Test Setup**

- 1.
- 2.
- 3.

**4.2.2.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

**4.2.2.7 RESULTS PASS**

All devices met the acceptance criteria.

Test	Display Interface (pass/fail)		
	Pass	Pass	Pass
	Pass	Pass	Pass
	Pass	Pass	Pass

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### **4.2.3 External Antenna Interface Test**

#### **4.2.3.1 Objective**

To verify the external antenna interface meets the requirements specified in the *Input/Output Connections* section of the PEM Electrical Specification.

#### **4.2.3.2 Method and Equipment**

#### **4.2.3.3 Test Cases**

There are test cases using all combinations of test values below:

Parameter	Test Values		Units

#### **4.2.3.4 Acceptance Criteria**

- When an external antenna is connected, there should be no downlink from the internal antenna.
- When an external antenna is connected, the uP should detect that the antenna is connected.

External Antenna					Yes/No
	Min	Max	Min	Max	
	—	—	—	—	—

#### **4.2.3.5 Test Setup**

- 1.
- 2.
- 3.
- 4.
- 5.

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**4.2.3.6 Test Procedure**

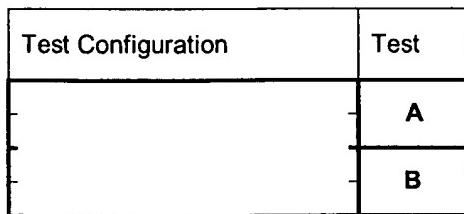
- 1.
- 2.
- 3.
- 4.

**4.2.3.7 RESULTS PASS**

All devices met the acceptance criteria.

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Test	External Antenna Interface (A/m)											
	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev
A												
B												

#### **4.2.4 Infrared Port Interface Test**

##### **4.2.4.1 Objective**

To verify the infrared port interface meets the requirements specified in the *Input/Output Connections* section of the PEM Electrical Specification. [PTPROG\_PEMT-0006:1]

##### **4.2.4.2 Method and Equipment**

##### **4.2.4.3 Test Cases**

There are test cases using all combinations of test values below:

Parameter	Test Values	Units

##### **4.2.4.4 Acceptance Criteria**

All	All	None

##### **4.2.4.5 Test Setup**

- 1.
- 2.

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3.

**4.2.4.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

**4.2.4.7 RESULTS PASS**

All devices met the acceptance criteria.

Voltage (V)	Infrared (pass/fail)								
	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

**4.2.5 Audio Transducer Test****4.2.5.1 Objective**

To verify the audio transducer meets the requirements specified in the *Input/Output Connections* section of the PEM Electrical Specification.

**4.2.5.2 Method and Equipment****4.2.5.3 Test Cases**

There are test cases using all combinations of test values below:

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Parameter	Test Values		Units
-	-	-	-

**4.2.5.4 Acceptance Criteria**


**4.2.5.5 Test Setup**

- 1.
- 2.
- 3.
- 4.
- 5.

**4.2.5.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

**4.2.5.7 RESULTS PASS**

All devices met the acceptance criteria.

	Audio Transducer (dB SPL)											
	Parameter 1				Parameter 2				Parameter 3			
	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev
-	-	-	-	-	-	-	-	-	-	-	-	-

**4.2.6 Manufacturing/Test Interface Test**

Manufacturing requirements defined in Test Specification, Patient Programmer, 215387.

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#### **4.3 Internal Resources Tests**

##### **4.3.1 Memory Test**

###### **4.3.1.1 Objective**

To verify the internal memory resources meet the requirements specified in the *Internal Resources* section of the PEM Electrical Specification.

###### **4.3.1.2 Method and Equipment**

###### **4.3.1.3 Test Cases**

There are test cases using all combinations of test values below:

Parameter	Test Values	Units

###### **4.3.1.4 Acceptance Criteria**

All	Pass

###### **4.3.1.5 Test Setup**

- 1.
- 2.
- 3.

###### **4.3.1.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

###### **4.3.1.7 RESULTS PASS**

All devices met the acceptance criteria.

Test	Memory (pass/fail)		
	Pass	Pass	Pass
	Pass	Pass	Pass
	Pass	Pass	Pass

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#### 4.3.2 Real-Time Clock Backup Test

##### 4.3.2.1 Objective

To verify the real-time clock backup meets the requirements specified in the *Internal Resources* section of the PEM Electrical Specification.

##### 4.3.2.2 Method and Equipment

##### 4.3.2.3 Test Cases

There is one test case below:

Parameter	Test Value	Units

##### 4.3.2.4 Acceptance Criteria

Test Case	Min Time w/o power (min)

##### 4.3.2.5 Test Setup

- 1.
- 2.
- 3.

##### 4.3.2.6 Test Procedure

- 1.
- 2.
- 3.
- 4.
- 5.

##### 4.3.2.7 RESULTS PASS

All devices met the acceptance criteria.

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Test	Real-Time Backup (pass/fail)		
		Pass	Pass
		Pass	Pass

#### 4.3.3 Real-Time Clock Accuracy Test

##### 4.3.3.1 Objective

To verify the real-time clock accuracy meets the requirements specified in the *Internal Resources* section of the PEM Electrical Specification.

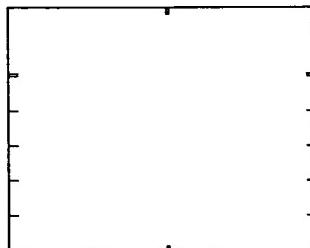
##### 4.3.3.2 Method and Equipment

##### 4.3.3.3 Test Cases

There are test cases (actually measurement points) using all combinations of test values below:

Parameter	Test Value	Units

##### 4.3.3.4 Acceptance Criteria



##### 4.3.3.5 Test Setup

- 1.
- 2.

##### 4.3.3.6 Test Procedure

- 1.
- 2.

##### 4.3.3.7 RESULTS PASS

All devices met the acceptance criteria.

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#### 4.3.4 A/D Measurements Test

#### **4.3.4.1 Objective**

To verify the A/D measurement accuracy meets the requirements specified in the *Internal Resources* section of the PEM Electrical Specification.

#### **4.3.4.2 Method and Equipment**

#### 4.3.4.3 Test Cases

There are \_\_\_\_\_ test cases using the test values below:

Parameter	Test Values	Units

#### **4.3.4.4 Acceptance Criteria**

A/D Voltage	Test Value	Max Error (%)
1.000	1.000	0.00%

#### 4.3.4.5 Test Setup

- 1.
  - 2.
  - 3.
  - 4.

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5.

**4.3.4.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

**4.3.4.7 RESULTS PASS**

All devices met the acceptance criteria.

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#### 4.3.5 D/A Control Voltages Test

#### **4.3.5.1 Objective**

To verify the D/A accuracy meets the requirements specified in the *Internal Resources* section of the PEM Electrical Specification.

#### **4.3.5.2 Method and Equipment**

#### **4.3.5.3 Test Cases**

There are test cases using all combinations of test values below:

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Parameter	Test Value	Units

**4.3.5.4 Acceptance Criteria**

D/A Voltage	Measurement point	Max % Error

**4.3.5.5 Test Setup**

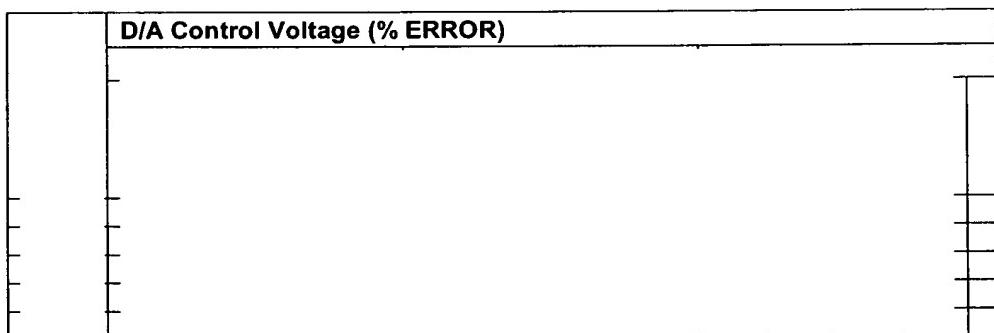
- 1.
- 2.
- 3.
  
- 4.

**4.3.5.6 Test Procedure**

- 1.
- 2.
- 3.

**4.3.5.7 RESULTS PASS**

All devices met the acceptance criteria.



**4.4 Transmit Telemetry (Downlink) Tests**

**4.4.1 Magnetic Field Intensity Test**

**4.4.1.1 Objective**

To verify downlink magnetic field intensity meets the requirements specified in the *Transmit Telemetry (Downlink)* section of the PEM Electrical Specification.

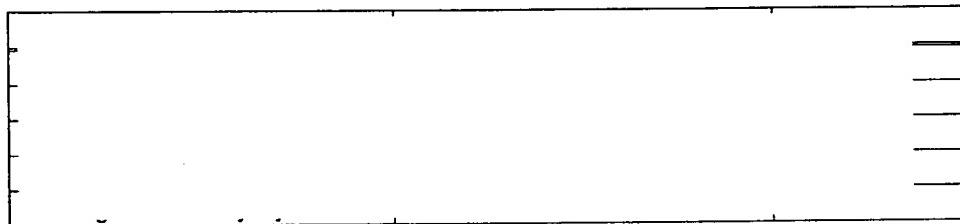
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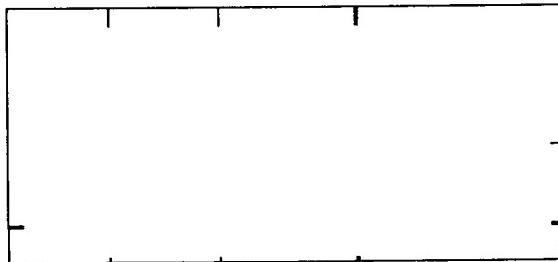
**4.4.1.2 Method and Equipment**

**4.4.1.3 Test Cases**

There are    test cases at    kHz using all combinations of test values below:



**4.4.1.4 Acceptance Criteria**



**4.4.1.5 Test Setup**

- 1.
- 2.
- 3.
- 4.
- 5.

**4.4.1.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

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5.

**4.4.1.7 RESULTS PASS**

All devices met the acceptance criteria.

Magnetic Field Intensity (A/m)	

**4.4.2 Burst Characteristics Test**

**4.4.2.1 Objective**

To verify downlink burst characteristics of width, rise time, fall time, frequency, and overshoot meet the requirements specified in the *Transmit Telemetry (Downlink)* section of the PEM Electrical Specification.

**4.4.2.2 Method and Equipment**

**4.4.2.3 Test Cases**

There are test cases using all combinations of test values below:

Parameter	Test Values	Units

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#### **4.4.2.4 Acceptance Criteria**

10. The following is a list of statements concerning the use of the Internet. Indicate whether each statement is true or false.

#### **4.4.2.5 Test Setup**

1. 2. 3. 4. 5.

#### 4.4.2.6 Test Procedure

1.  
2

3.  
4.  
5.

#### **4.4.2.7 RESULTS PASS**

All devices met the acceptance criteria.

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#### 4.5 Receive Telemetry (Uplink) Tests

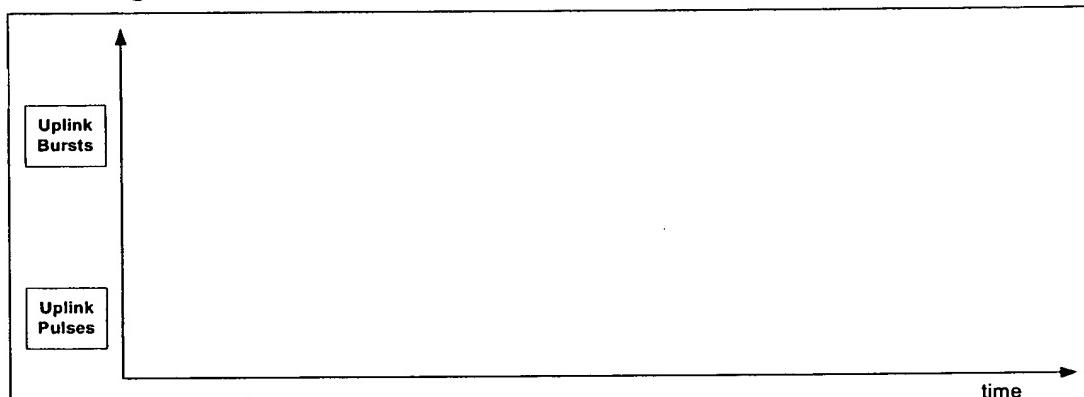
##### 4.5.1 Detection Threshold Test

###### 4.5.1.1 Objective

To verify uplink detection threshold (i.e. receiver sensitivity) meets the requirements specified in the *Receive Telemetry (Uplink)* section of the PEM Electrical Specification.

###### 4.5.1.2 Method and Equipment

**Figure 1: Example Uplink Detection Threshold Test Waveforms**



###### 4.5.1.3 Test Cases

There are test cases using all combinations of test values below:

Parameter	Test Values	Units

The supply voltage is 2.5 V.

**EXHIBIT B (cont.)**



**Medtronic**

## *Neurological*

**Document Number**

Rev/Version  
1.0

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## Title: Neuro Patient Programmer Platform Electrical DVT Report

#### **4.5.1.4 Acceptance Criteria**

Antenna	Telemetry Type	Detection Onset (Uplink dB)	Detection Threshold (Uplink dB)	Maximum Input Level (Uplink dB)
		Max	Max	Max
Antenna A	Telemetry Type A	-10	-5	10
Antenna B	Telemetry Type B	-12	-7	8
Antenna C	Telemetry Type C	-15	-10	5
Antenna D	Telemetry Type D	-18	-12	3

#### **4.5.1.5 Test Setup**

1. 2. 3. 4. 5.

#### 4.5.1.6 Test Procedure

1.  
2.  
3.  
4

#### 4.5.1.7 RESULTS PASS

All devices met the acceptance criteria.

Antenna	Telemetry	Detection Threshold (dB)							
		Min	Max	Mean	Std dev	Min	Max	Mean	Std dev
Antenna A	Telemetry 1	10.5	12.2	11.1	0.8	10.8	12.5	11.3	0.7
Antenna B	Telemetry 2	11.0	12.8	11.5	0.9	11.2	12.9	11.6	0.8
Antenna C	Telemetry 3	10.8	12.0	11.2	0.7	11.0	12.7	11.4	0.9
Antenna D	Telemetry 4	11.5	12.5	11.8	0.6	11.3	12.6	11.7	0.8
Antenna E	Telemetry 5	10.9	12.1	11.0	0.7	11.1	12.4	11.2	0.9
Antenna F	Telemetry 6	11.2	12.3	11.4	0.8	11.4	12.6	11.6	0.7
Antenna G	Telemetry 7	10.7	12.0	11.0	0.9	10.9	12.1	11.1	0.8
Antenna H	Telemetry 8	11.3	12.4	11.6	0.7	11.5	12.7	11.8	0.9
Antenna I	Telemetry 9	10.6	12.1	11.0	0.8	10.8	12.2	11.2	0.7
Antenna J	Telemetry 10	11.1	12.6	11.5	0.6	11.3	12.8	11.7	0.8

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 32 of 49
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Antenna	Telemetry	Maximum Input Level (pass/fail)		
		Pass	Pass	Pass
		Pass	Pass	Pass
		Pass	Pass	Pass
		Pass	Pass	Pass
		Pass	Pass	Pass
		Pass	Pass	Pass
		Pass	Pass	Pass

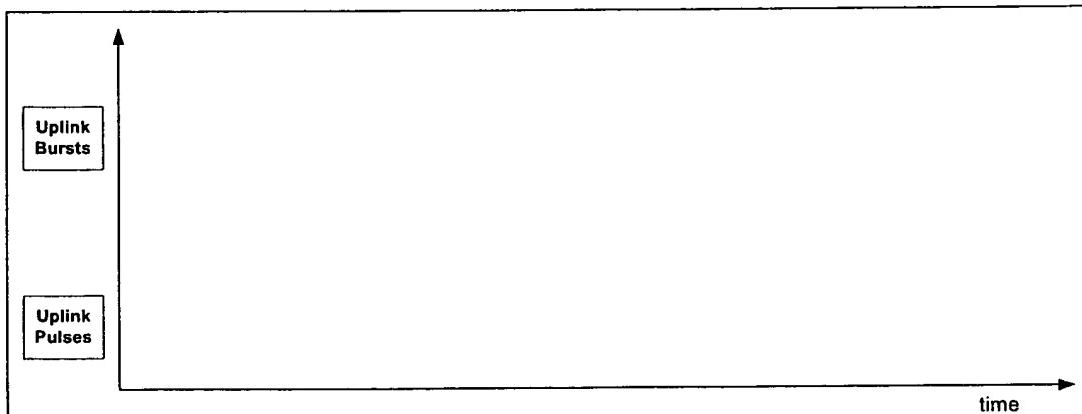
#### 4.5.2 Detection Margin Test

##### 4.5.2.1 Objective

To verify uplink detection margin meets the requirements specified in the *Receive Telemetry (Uplink)* section of the PEM Electrical Specification.

##### 4.5.2.2 Method and Equipment

Figure 2: Example Uplink Detection Margin Test Waveforms



##### 4.5.2.3 Test Cases

There are test cases using all combinations of test values below:

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 33 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

Parameter	Test Values	Units

**4.5.2.4 Acceptance Criteria**

Telemetry Type	Data Bursts	Amplitude A1	Antenna	Detection Margin (Uplink dB)	
				Min	Max

**4.5.2.5 Test Setup**

- 1.
- 2.
- 3.
- 4.
  
- 5.

**4.5.2.6 Test Procedure**

- 1.
- 2.
- 3.
  
- 4.

**4.5.2.7 RESULTS PASS**

All devices met the acceptance criteria.

## EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 34 of 49
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Antenna	Telemetry	Detection Margin (dB)											
		Min	Max	Mean	Std dev	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev

#### 4.5.3 Noise Immunity Test

##### 4.5.3.1 Objective

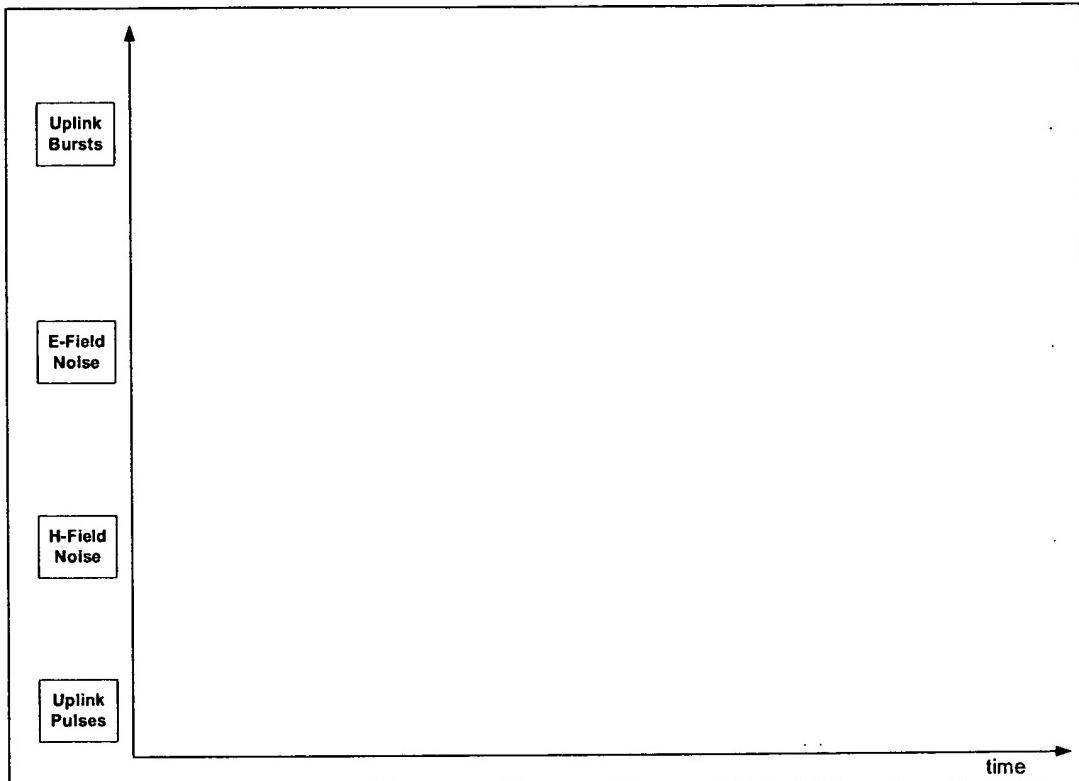
To verify uplink noise immunity meets the requirements specified in the *Receive Telemetry (Uplink)* section of the PEM Electrical Specification.

##### 4.5.3.2 Method and Equipment

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 35 of 49
Title: Neuro Patient Programmer Platform Electrical DVT Report				

**Figure 3: Example Uplink Noise Immunity Test Waveforms**



#### 4.5.3.3 Test Cases

There are      test cases using all combinations of test values below:

Parameter	Test Values	Units

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 36 of 49
Title: Neuro Patient Programmer Platform Electrical DVT Report				

**4.5.3.4 Acceptance Criteria**

Telemetry Type	Uplink Level A1 (dB)	Antenna	Min E-Noise Immunity (dB)	Min H-Noise Immunity (dB)

**4.5.3.5 Test Setup**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

**4.5.3.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.
- 5.

**4.5.3.7 RESULTS PASS**

All devices met the acceptance criteria.

## EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 37 of 49
<b>Title: Neuro Patient Programmer Platform Electrical DVT Report</b>				

Antenna	Noise	Telemetry	Noise Immunity (dB)											
			Min	Max	Mean	Std dev	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev

#### 4.5.4 Signal Distortion Test

##### 4.5.4.1 Objective

To verify uplink signal distortion meets the requirements specified in the *Receive Telemetry (Uplink)* section of the PEM Electrical Specification.

##### 4.5.4.2 Method and Equipment

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 38 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

**4.5.4.3 Test Cases**

Parameter	Test Values	Units

There are test cases for Tel A, and test cases for Tel N.

**4.5.4.4 Acceptance Criteria**

Telemetry Type	Uplink Level A1 (dB)	Antenna	Interval Distortion ( $\mu$ s)	Activemode Distortion ( $\mu$ s)

**4.5.4.5 Test Setup**

- 1.
- 2.
- 3.
- 4.
- 5.

**4.5.4.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

**4.5.4.7 RESULTS PASS**

All devices met the acceptance criteria.

**EXHIBIT B (cont.)**



**Medtronic**

## *Neurological*

**Document Number**

Rev/Version  
1.0

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Title: Neuro Patient Programmer Platform Electrical DVT Report

## EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 40 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

Antenna	Test	Uplink (dB)	Signal Distortion Telemetry N, 1's (us)											
			Min	Max	Mean	Std dev	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev

#### 4.5.5 Turnaround Time Test

##### 4.5.5.1 Objective

To verify uplink turnaround time meets the requirements specified in the *Receive Telemetry (Uplink)* section of the PEM Electrical Specification.

##### 4.5.5.2 Method and Equipment

##### 4.5.5.3 Test Cases

There are test cases using all combinations of test values below:

Parameter	Test Values	Units

## EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 41 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

**4.5.5.4 Acceptance Criteria**

Supply Voltage	H-Bridge Drive Duty Cycle	Turnaround Time (mS)

**4.5.5.5 Test Setup**

- 1.
- 2.
- 3.

**4.5.5.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.

**4.5.5.7 RESULTS PASS**

All devices met the acceptance criteria.

Test	Turnaround Time (pass/fail)

**4.5.6 Hold Drift Test****4.5.6.1 Objective**

To verify the hold drift meets the requirements specified in the *Receive Telemetry (Uplink)* section of the PEM Electrical Specification.

**4.5.6.2 Method and Equipment**

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 42 of 49
Title: Neuro Patient Programmer Platform Electrical DVT Report				

**4.5.6.3 Test Cases**

There is test case:

Parameter	Uplink Level	Units

**4.5.6.4 Acceptance Criteria**

Time after hold circuit enabled	Max Hold Drift

**4.5.6.5 Test Setup**

- 1.
- 2.
- 3.

**4.5.6.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 43 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

**4.5.6.7 RESULTS PASS**

All devices met the acceptance criteria.

Hold Drift (mV)

**4.5.7 New-Battery FET Test****4.5.7.1 Objective**

To verify that enabling the new-battery FET circuit reduces the receiver noise floor (ambient RF energy detected by the receiver circuit) when new batteries are used.

**4.5.7.2 Method and Equipment****4.5.7.3 Test Cases**

There is test case:

Parameter	Uplink Level	Units

**4.5.7.4 Acceptance Criteria**

Supply Voltage	New-Battery FET	RSSI Peak

**4.5.7.5 Test Setup**

- 1.
- 2.
- 3.

## EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 44 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

**4.5.7.6 Test Procedure**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

**4.5.7.7 RESULTS PASS**

All devices met the acceptance criteria.

	New-Battery FET (mV)											
	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev	Min	Max	Mean	Std dev

**4.6 Telemetry Performance Tests****4.6.1 Telemetry Map Area at a Fixed Distance Test****4.6.1.1 Objective**

To verify telemetry performance in terms of map area at a fixed distance meets the requirements specified in the *Telemetry Performance* section of the PEM Electrical Specification.

**4.6.1.2 Method and Equipment**

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 45 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

**4.6.1.3 Test Cases**

Parameter	Test Values	Units

There are test cases.

**4.6.1.4 Acceptance Criteria**

IPG	Antenna	Map Area @ 5cm

**4.6.1.5 Test Setup**

- 1.
- 2.

**4.6.1.6 Test Procedure**

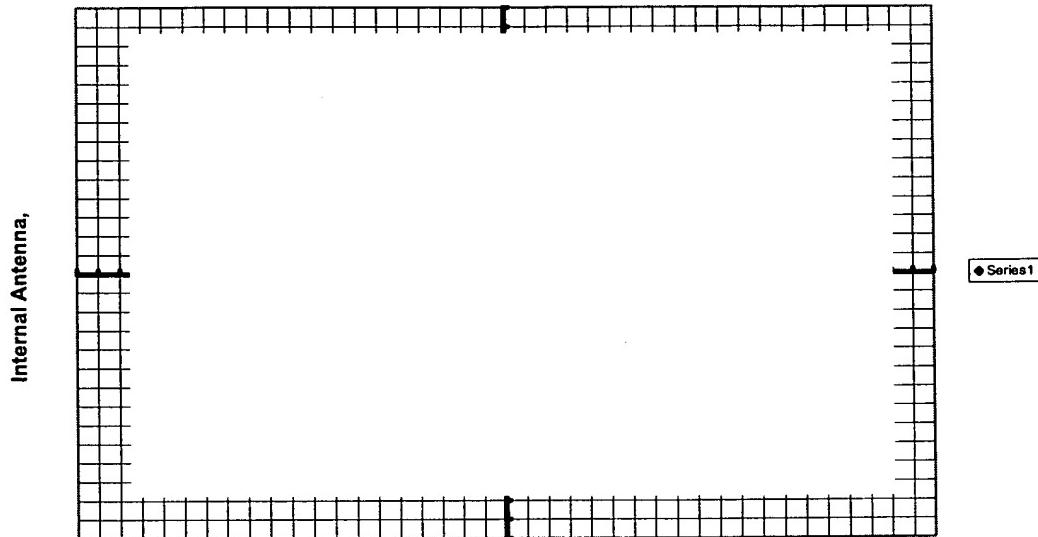
- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**4.6.1.7 RESULTS PASS**

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 46 of 49
<b>Title: Neuro Patient Programmer Platform Electrical DVT Report</b>				

4.6.1.7.1 Internal Antenna Map @



4.6.1.7.2 Internal Antenna @

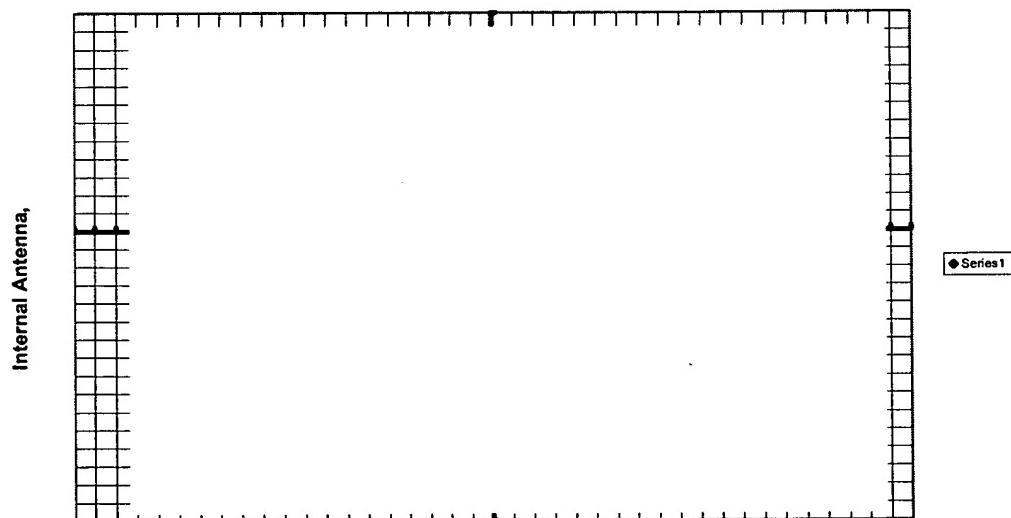
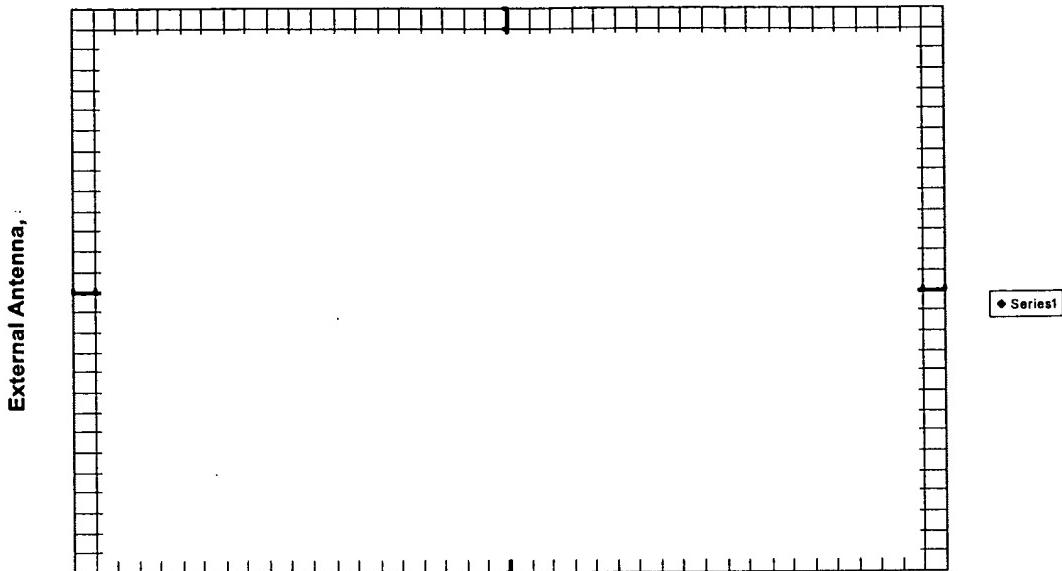


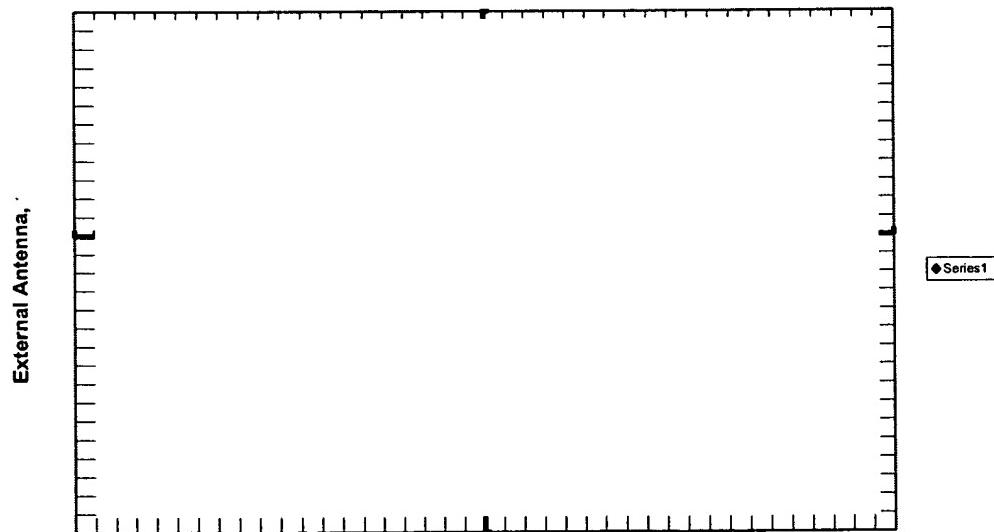
EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 47 of 49
<b>Title: Neuro Patient Programmer Platform Electrical DVT Report</b>				

4.6.1.7.3 External Antenna Map @



4.6.1.7.4 External Antenna @

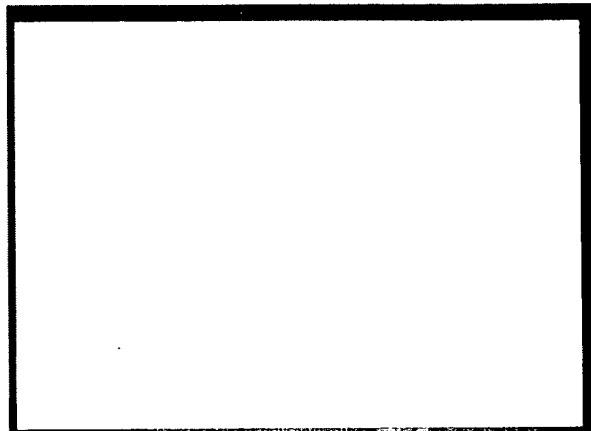


4.6.1.7.5 Photo of test fixture showing

EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 48 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

in this photo.



4.6.1.7.6 Photo of

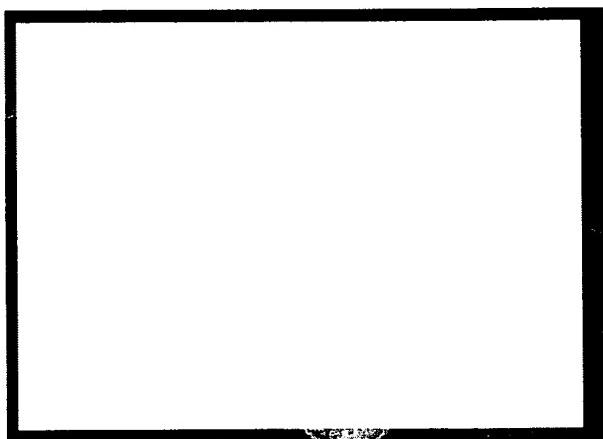


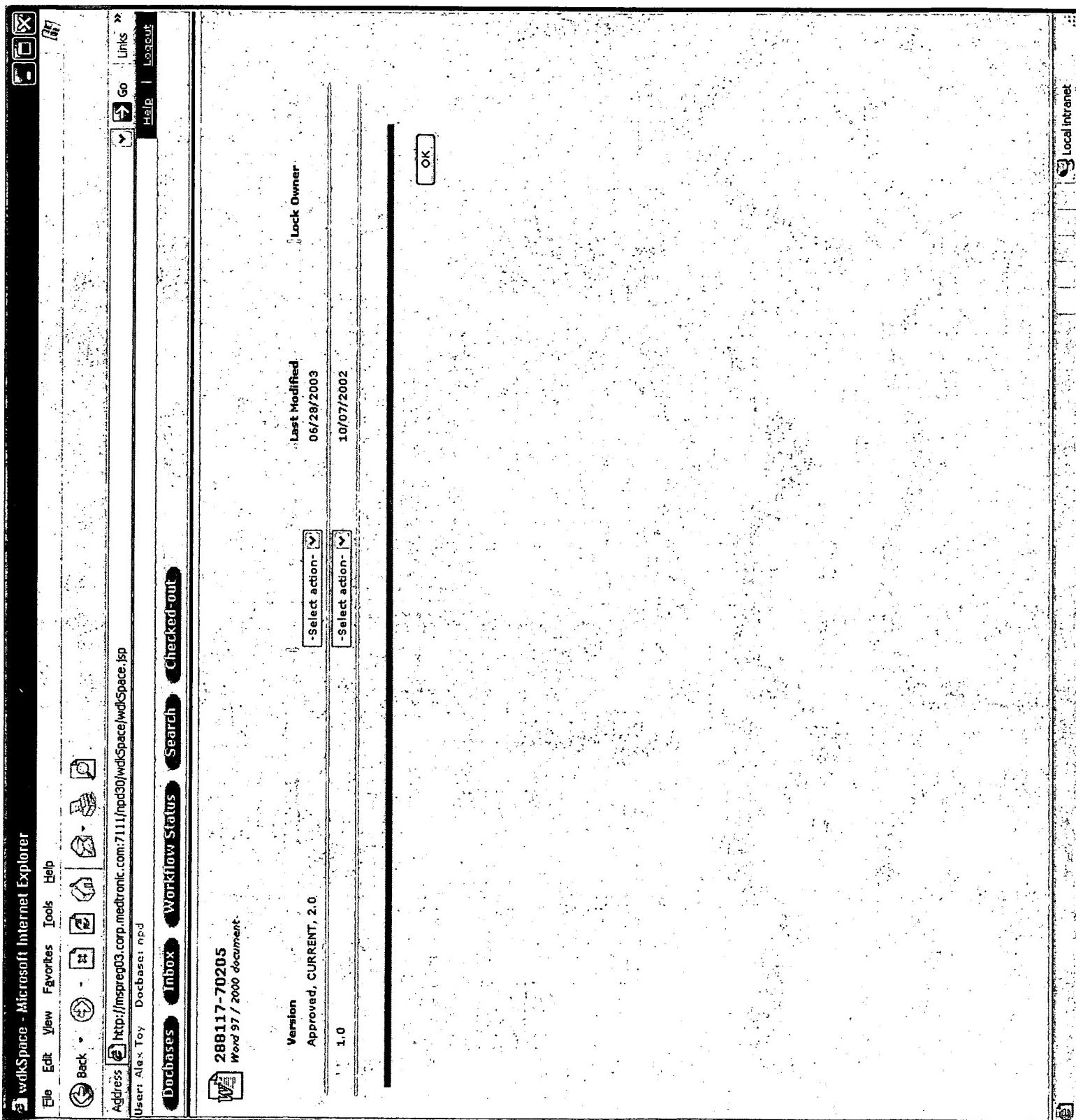
EXHIBIT B (cont.)

 <b>Medtronic</b>	<i>Neurological</i>	Document Number 288117-70205	Rev/Version 1.0	Sht 49 of 49
<b>Title:</b> Neuro Patient Programmer Platform Electrical DVT Report				

**5 COMPLETION**

This paragraph concludes this test specification.

## Exhibit C



**Test Path #1 from DVT Plan 288117-70020 Section 7.0****DVT Pre-Test Performed to verify operational units.**

Serial Number	Buttons	operational	Audio	LCD	Battery contact	Battery Door	Real time clock	IR	Backlight Communication	Results
NJD000018P	x	x	x	x	x	x	x	x	x	OK
NJD000019P	x	x	x	x	x	x	x	x	x	OK
NJD000020P	x	x	x	x	x	x	x	x	x	OK
NJD000022P	x	x	x	x	x	x	x	x	x	OK
NJD000024P	x	x	x	x	x	x	x	x	x	OK
NJD000025P	x	x	x	x	x	x	x	x	x	OK
NJD000026P	x	x	x	x	x	x	x	x	x	OK
NJD000028P	x	x	x	x	x	x	x	x	x	OK
NJD000031P	x	x	x	x	x	x	x	x	x	OK
NJD000033P	x	x	x	x	x	x	x	x	x	OK
NJD000034P	x	x	x	x	x	x	x	x	x	OK
NJD000035P	x	x	x	x	x	x	x	x	x	OK
NJD000036P	x	x	x	x	x	x	x	x	x	OK
NJD000037P	x	x	x	x	x	x	x	x	x	OK
NJD000077P	x	x	x	x	x	x	x	x	x	OK
NJD000078P	x	x	x	x	x	x	x	x	x	OK
NJD000079P	x	x	x	x	x	x	x	x	x	OK
NJD000080P	x	x	x	x	x	x	x	x	x	OK
NJD000138P	x	x	x	x	x	x	x	x	x	OK
NJD000139P	x	x	x	x	x	x	x	x	x	OK
NJD000140P	x	x	x	x	x	x	x	x	x	OK
NJD000149P	x	x	x	x	x	x	x	x	x	OK

Testing performed by

Date: 23-May-02

EQUIPMENT:

288117-70183

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**PAR# 5365**  
**Patient Programmer for Neuro devices.**  
**DATE: 29 MAY 02**

**TEST PLAN: 2881117-70020**  
**INITIAL VISUAL & ELECTRICAL**

**SUMMARY SHEET****TECH:**

SERIAL#	VISUAL	Requestor did functional
NJD000018P	O.K.	X
NJD000019P	O.K.	X
NJD000020P	O.K.	X
NJD000022P	O.K.	X
NJD000024P	O.K.	X
NJD000025P	O.K.	X
NJD000026P	O.K.	X
NJD000028P	O.K.	X
NJD000031P	O.K.	X
NJD000033P	O.K.	X
NJD000034P	O.K.	X
NJD000035P	O.K.	X
NJD000036P	O.K.	X
NJD000037P	O.K.	X
NJD000077P	O.K.	X
NJD000078P	O.K.	X
NJD000079P	O.K.	X
NJD000080P	O.K.	X
NJD000138P	O.K.	X
NJD000139P	O.K.	X
NJD000140P	O.K.	X
NJD000149P	O.K.	X
		3-Jun

**Exhibit D (cont.)****RESULTS: NO ANOMALIES NOTED**

**SUMMARY SHEET****TEST PLAN: 288117-70020**

Patient Programmer for Neuro devices.

19-Jun-02

Life cycle of battery contacts and door, and external antenna jack.

DATE:

Subject samples

288117-70020 test number	Serial Number	Battery Door	Battery External Contact Antenna	Dimension	Weight w/o batteries	2 AA batteries	Total Weight
		cycles	cycles				
	NJD0000018P	6.3.3	6.3.4	6.3.1	6.3.2	6.3.2	6.3.2
	NJD0000019P						
	NJD0000020P						
	NJD0000022P						
	NJD0000024P						
	NJD0000025P						
	NJD0000026P						
	NJD0000028P						
	NJD0000031P						
	NJD0000033P						
	NJD0000034P						
	NJD0000035P						
	NJD0000036P						
	NJD0000037P						
	NJD0000077P						
	NJD0000078P						
	NJD0000079P						
	NJD0000080P						
	NJD000138P						
	NJD000139P						
	NJD000140P						
	NJD000149P						

Average

Exhibit D (cont.)

**Std Dev**

Dimensions per print 502814

**EQUIPMENT:**

**SUMMARY SHEET****TEST PLAN: 288117-70020**

PAR# 5365 Patient Programmer for Neuro devices.

Storage Temperature paragraph 6.2.2 of test plan.

DATE: 19-Jun-02 All Functional Testing done per 6.1 except backlight and IR port.

Subject samples to low temp. storage of degrees F for hours then degrees F for hours.

Functional test samples post each temperature storage.

Serial #	Functional	Functional
NJD000018P		
NJD000019P		
NJD000020P		
NJD000022P		
NJD000024P		
NJD000025P		
NJD000026P		
NJD000028P		
NJD000031P		
NJD000033P		
NJD000034P		
NJD000035P		
NJD000036P		
NJD000037P		
NJD0000077P		
NJD0000078P		
NJD0000079P		
NJD0000080P		
NJD000138P		
NJD000139P		
NJD000140P		
NJD000149P		
Date: Complete	18-Jun	18-Jun
	19-Jun	19-Jun

NOTES:

A=      B=      C=

Results:

288117-70183

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**EQUIPMENT:**

Exhibit D (cont.)

**SUMMARY SHEET****PAR# 5365 TEST PLAN: 288117-70020**

Patient Programmer for Neuro devices. Operating Temperature paragraph 6.2.1 of test plan.  
 DATE: 4-Jun-02 All Functional Testing done per 6.1 except backlight and IR port.  
 Subject samples to Low temp. storage of degrees F for hours then degrees F for hours.

Serial #	Low temp.	Functional	High Temp.	Functional
NJD0000018P				
NJD0000019P				
NJD0000020P				
NJD0000022P				
NJD0000024P				
NJD0000025P				
NJD0000026P				
NJD0000028P				
NJD0000031P				
NJD0000033P				
NJD0000034P				
NJD0000035P				
NJD0000036P				
NJD0000037P				
NJD0000077P				
NJD0000078P				
NJD0000079P				
NJD0000080P				
NJD000138P				
NJD000139P				
NJD000140P				
NJD000149P				
Date: Complete	4-Jun	4-Jun	5-Jun	5-Jun

NOTES: A=

Results:

EQUIPMENT:

**SUMMERY SHEET****PAR# 5365 TEST PLAN: 288117-70020**

Patient Programmer for Neuro devices.

DATE: 20-Jun-02 Thermal Shock paragraph 6.2.3 of test plan.

Subject samples tc cycles of degrees F. | degrees F. then | Dwell at each temperature for 1 hour. All Functional Testing done per 6.1 except backlight and IR port.

Serial #	Shock	Thermal	Functional	Visual
NJD000018P				
NJD000019P				
NJD000020P				
NJD000022P				
NJD000024P				
NJD000025P				
NJD000026P				
NJD000028P				
NJD000031P				
NJD000033P				
NJD000034P				
NJD000035P				
NJD000036P				
NJD000037P				
NJD000077P				
NJD000078P				
NJD000079P				
NJD000080P				
NJD000138P				
NJD000139P				
NJD000140P				
NJD000149P				

Exhibit D (cont.)

NOTES: A=

RESULTS:

EQUIPMENT:

288117-70183

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**SUMMARY SHEET****TECH:****TEST PLAN: 288117-70020**

Patient Programmer for Neuro devices.

DATE: 21-Jun-02 Chemical Resistance paragraph 6.2.7 of test plan.

Subject samples to

Serial #	Chemical Testing	Visual
NJD000018P		
NJD000019P		
NJD000020P		
NJD000022P		
NJD000024P		
NJD000025P		
NJD000026P		
NJD000028P		
NJD000031P		
NJD000033P		
NJD000034P		
NJD000035P		
NJD000036P		
NJD000037P		
NJD000077P		
NJD000078P		
NJD000079P		
NJD000080P		
NJD000138P		
NJD000139P		
NJD000140P		
NJD000149P		

**Exhibit D (cont.)****RESULTS:****EQUIPMENT:**

288117-70183

Test Path #2 from DVT Plan 288117-70020 Section 7.0

DVT Pre-Test Performed to verify operational units.

**Exhibit D (cont.)**

## EQUIPMENT:

•

Testing performed by

Date: 23-May-02

**SUMMARY SHEET****PAR# 5365 TEST PLAN: 288117-70020**

Patient Programmer for Neuro devices.

DATE: 29 MAY 02

INITIAL VISUAL &amp; ELECTRICAL

**TECH:**

SERIAL#	VISUAL	Requestor
NJD000109P	O.K.	X
NJD000110P	O.K.	X
NJD000111P	O.K.	X
NJD000113P	O.K.	X
NJD000114P	O.K.	X
NJD000116P	O.K.	X
NJD000119P	O.K.	X
NJD000120P	O.K.	X
NJD000121P	O.K.	X
NJD000122P	O.K.	X
NJD000123P	O.K.	X
NJD000124P	O.K.	X
NJD000126P	O.K.	X
NJD000127P	O.K.	X
NJD000128P	O.K.	X
NJD000129P	O.K.	X
NJD000130P	O.K.	X
NJD000131P	O.K.	X
NJD000133P	O.K.	X
NJD000134P	O.K.	X
NJD000136P	O.K.	X
NJD000137P	O.K.	X
		29-May

**Exhibit D (cont.)****RESULTS:**

**PAR# 5365 TEST PLAN: 288117-70020**  
 Patient Programmer for Neuro devices. Broad Band Random Vibration paragraph 6.2.4 of test plan.  
 DATE: 4-Jun-02 All Functional Testing done per 6.1 except backlight and IR port.  
 Subject samples to ).

**SUMMARY SHEET****TECH:**

SERIAL#	Back down	Visual	R. side down	Visual	Top up	Visual	Functional	Observations
NJD000109P								
NJD000110P								
NJD000111P								
NJD000113P								
NJD000114P								
NJD000116P								
NJD000119P								
NJD000120P								
NJD000121P								
NJD000122P								
NJD000123P								
NJD000124P								
NJD000126P								
NJD000127P								
NJD000128P								
NJD000129P								
NJD000130P								
NJD000131P								
NJD000133P								
NJD000134P								
NJD000136P								
NJD000137P								
Date Completed	7-Jun		7-Jun		7-Jun		7-Jun	
								13-Jun

Exhibit D (cont.)

NOTES:  
 A=  
 B=  
 C=

RESULTS:

EQUIPMENT:

**PAR# 5365**  
Patient Programmer for Neuro devices.

DATE:

20-Jun-02  
All Functional Testing done per 6.1 except backlight and IR port.

Subject samples to

**SUMMARY SHEET**  
**TEST PLAN: 288117-70020**  
**TECH: ROY POPE**

Mechanical Shock paragraph 6.2.5 of test plan.

SERIAL#	Front	Back	Top	Bottom	Left side	Right side	Testing
NJD000109P							
NJD000110P							
NJD000111P							
NJD000113P							
NJD000114P							
NJD000116P							
NJD000119P							
NJD000120P							
NJD000121P							
NJD000122P							
NJD000123P							
NJD000124P							
NJD000126P							
NJD000127P							
NJD000128P							
NJD000129P							
NJD000130P							
NJD000131P							
NJD000133P							
NJD000134P							
NJD000136P							
NJD000137P							

(cont.)

NOTES:      A=      B=

RESULTS:

EQUIPMENT:

**Test Path #3 from DVT Plan 288117-70020 Section 7.0****DVT Pre-Test Performed to verify operational units.**

Serial Number	operational	Buttons	Audio	LCD	Battery contact	Battery Door	Real time clock	IR	Backlight	Communication	Results
NJD000081P	x	x	x	x	x	x	x	x	x	x	OK
NJD000082P	x	x	x	x	x	x	x	x	x	x	OK
NJD000083P	x	x	x	x	x	x	x	x	x	x	OK
NJD000084P	x	x	x	x	x	x	x	x	x	x	OK
NJD000086P	x	x	x	x	x	x	x	x	x	x	OK
NJD000087P	x	x	x	x	x	x	x	x	x	x	OK
NJD000089P	x	x	x	x	x	x	x	x	x	x	OK
NJD000092P	x	x	x	x	x	x	x	x	x	x	OK
NJD000093P	x	x	x	x	x	x	x	x	x	x	OK
NJD000094P	x	x	x	x	x	x	x	x	x	x	OK
NJD000096P	x	x	x	x	x	x	x	x	x	x	OK
NJD000097P	x	x	x	x	x	x	x	x	x	x	OK
NJD000098P	x	x	x	x	x	x	x	x	x	x	OK
NJD000099P	x	x	x	x	x	x	x	x	x	x	OK
NJD000100P	x	x	x	x	x	x	x	x	x	x	OK
NJD000101P	x	x	x	x	x	x	x	x	x	x	OK
NJD000102P	x	x	x	x	x	x	x	x	x	x	OK
NJD000103P	x	x	x	x	x	x	x	x	x	x	OK
NJD000104P	x	x	x	x	x	x	x	x	x	x	OK
NJD000106P	x	x	x	x	x	x	x	x	x	x	OK
NJD000107P	x	x	x	x	x	x	x	x	x	x	OK
NJD000108P	x	x	x	x	x	x	x	x	x	x	OK

Exhibit D (cont.)

EQUIPMENT: |

Testing performed by | Date: 23-May-02

**PAR# 5365**  
**Patient Programmer for Neuro devices.**  
**DATE: 29 MAY 02**

**TECH:****TEST PLAN: 288117-70020**

**INITIAL VISUAL & ELECTRICAL**

SERIAL#	VISUAL	Requestor
NJD000081P	O.K.	X
NJD000082P	O.K.	X
NJD000083P	O.K.	X
NJD000084P	O.K.	X
NJD000086P	O.K.	X
NJD000087P	O.K.	X
NJD000089P	O.K.	X
NJD000092P	O.K.	X
NJD000093P	O.K.	X
NJD000094P	O.K.	X
NJD000096P	O.K.	X
NJD000097P	O.K.	X
NJD000098P	O.K.	X
NJD000099P	O.K.	X
NJD000100P	O.K.	X
NJD000101P	O.K.	X
NJD000102P	O.K.	X
NJD000103P	O.K.	X
NJD000104P	O.K.	X
NJD000106P	O.K.	X
NJD000107P	O.K.	X
NJD000108P	O.K.	X
Date: Complete	29-May	

**Exhibit D (cont.)****RESULTS: NO ANOMALIES NOTED**

SUMMARY SHEET

PAR# 5365

Patient Programmer for Neuro devices.

TEST PLAN: 288117-70020

TECH

Patient Programmer for Neuro devices.		DATE:	29-May-02	All Functional Testing done per 6.1 except backlight and IR port.
Subject	SERIAL#	samples to	degrees F and	RH for days. Test samples per request
	NJD0000081P			
	NJD0000082P			
	NJD0000083P			
	NJD0000084P			
	NJD0000086P			
	NJD0000087P			
	NJD0000089P			
	NJD0000092P			
	NJD0000093P			
	NJD0000094P			
	NJD0000096P			
	NJD0000097P			
	NJD0000098P			
	NJD0000099P			
	NJD0000100P			
	NJD0000101P			
	NJD000102P			
	NJD000103P			
	NJD000104P			
	NJD000106P			
	NJD000107P			
	NJD000108P			
Date: Complete	3-Jun	3-Jun	4-Jun	4-Jun
			19-Jun	19-Jun

## NOTES.

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**NOTES:**

288117-70183

Page 16 of 29

**Exhibit D (cont.)**

EQUIPMENT:

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Exhibit D (cont.)

Other Data

DVT Test Data for 288117-70020

Revision 4.0

Section 6.3.6 Button Endurance - Specification for KSS321G, used for  
..... buttons ( .....  
Life Cycle data show life expectancy of

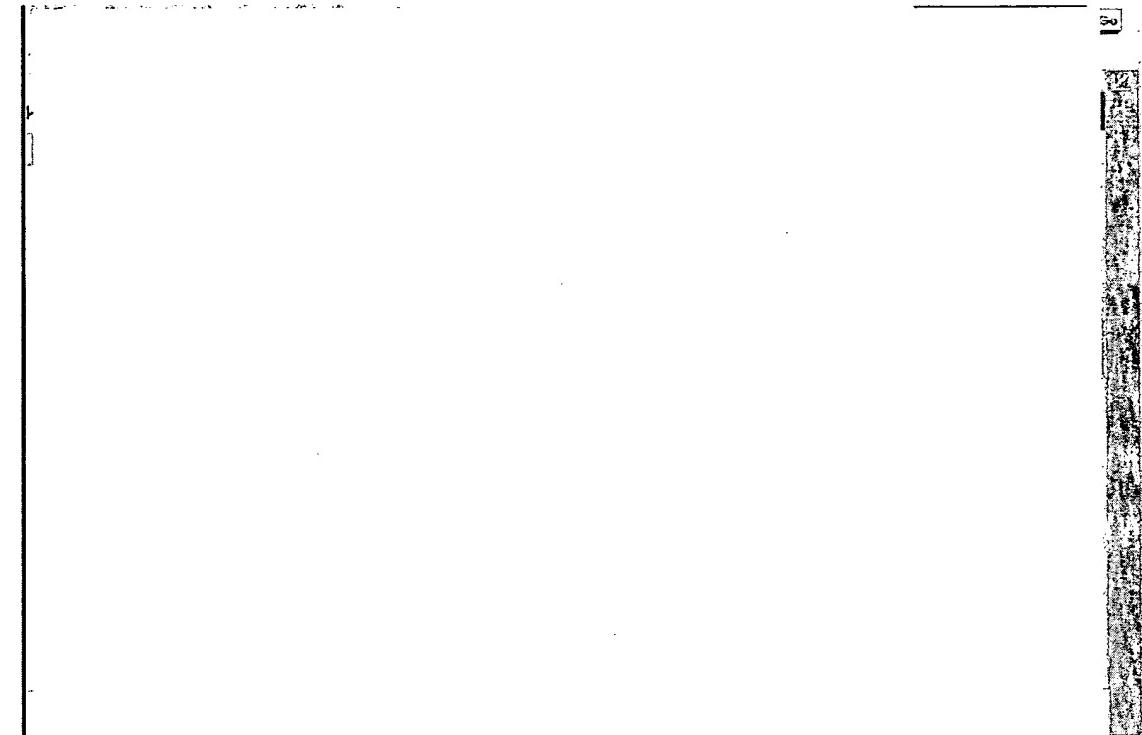


Exhibit D (cont.)

Other Data

DVT Test Data for 288117-70020

Revision 4.0

Section 6.3.8 Flammability - Both top and bottom housings are made from

**Exhibit D (cont.)**

**Other Data**

**DVT Test Data for 288117-70020**

**Revision 4.0**

Exhibit D (cont.)

Other Data

DVT Test Data for 288117-70020

Revision 4.0

Section 6.3.6 - Button Endurance - Specification for KSC621- Used for  
top buttons ( )  
Life Cycle data show life expectancy

**Exhibit D (cont.)**

**Other Data**

**DVT Test Data for 288117-70020**

**Revision 4.0**

6-21

**Exhibit D (cont.)**

**Other Data**

**DVT Test Data for 288117-70020**

**Revision 4.0**

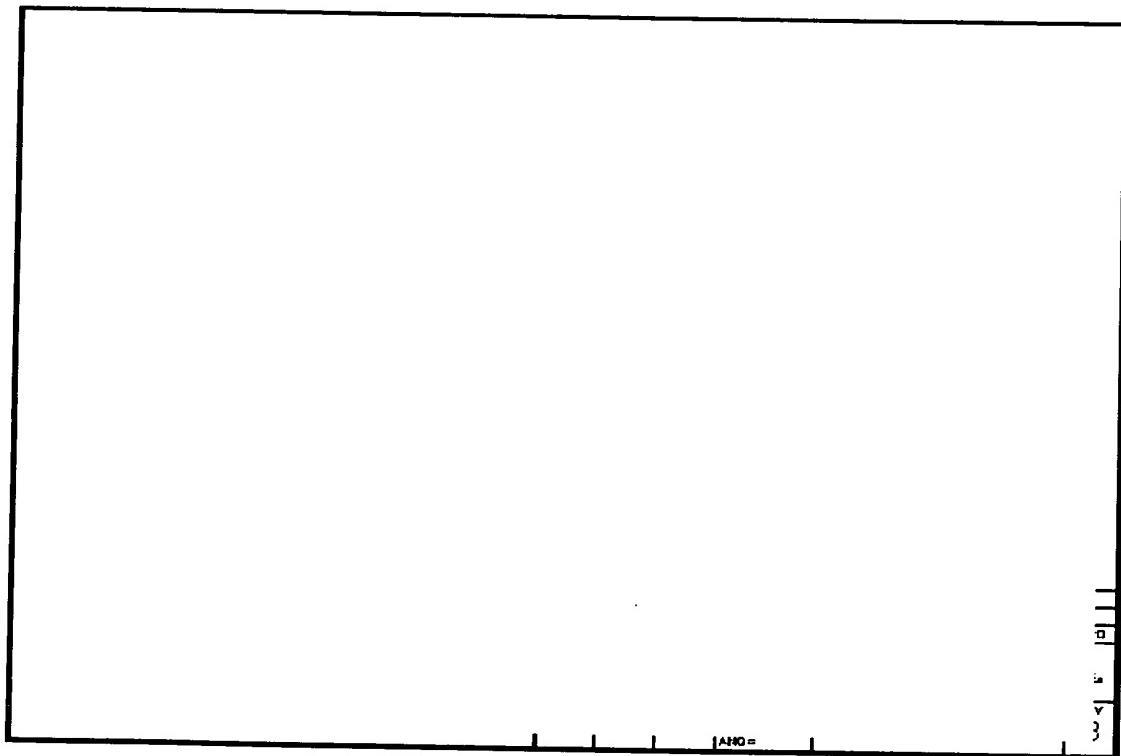
Exhibit D (cont.)

Other Data

DVT Test Data for 288117-70020

Revision 4.0

Section 6.3.6 - Button Endurance - Specification for F  
Used for  
life expectancy of . Life Cycle data show



**Exhibit D (cont.)**

Other Data

DVT Test Data for 288117-70020

Revision 4.0

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**Exhibit D (cont.)**

**Other Data**

**DVT Test Data for 288117-70020**

**Revision 4.0**

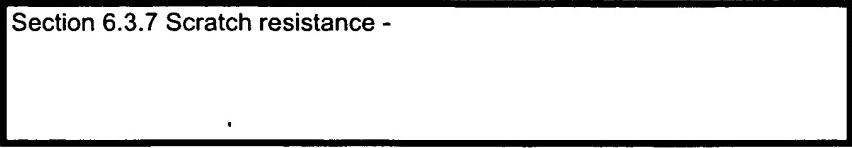
**Exhibit D (cont.)**

Other Data

DVT Test Data for 288117-70020

Revision 4.0

Section 6.3.7 Scratch resistance -



**Exhibit D (cont.)**

**Other Data**

**DVT Test Data for 288117-70020**

**Revision 4.0**

**Exhibit D (cont.)**

Other Data

DVT Test Data for 288117-70020

Revision 4.0